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ERGONOMIC COMPUTER WORK STATION

FIELD OF THE INVENTION

[0001] This invention relates generally to an ergonomic work station. More particularly, the invention relates to a work station specially adapted for ease of use by an individual bothered by back pain.

BACKGROUND OF THE INVENTION

[0002] Many occupations require a worker to spend long periods of time in front of a computer screen. Problems associated with repetitive motion injuries due to computer keyboard or mouse manipulation may result in injuries to a computer user. A well known injury associated with repetitive motion is carpal tunnel syndrome. Injuries and discomfort may be minimized by proper positioning of a user with respect to a work object. Ergonomic designs for chairs and work stations have attempted to address these problems.

[0003] For an individual who experiences back pain, however, the simple act of sitting upright for long periods of time may result in debilitating discomfort. Further, the simple act of entering or exiting from a typical computer work station requires that a user bend his or her body in ways that may be uncomfortable or impossible for an individual experiencing back pain.

[0004] Some inventors have attempted to address the needs of individuals who, for whatever reason, are unable to sit in front of a computer. For example, USPN 4,848,710 to Newman teaches a "Support Device" wherein a personal computer may be used by a person lying on a bed. The support body can be mounted on the bed itself, or on a base running on wheels beneath the bed.

[0005] Another example is United States patent no. 5,630,566 to Case for a "Portable Ergonomic Work Station". Case teaches a portable workstation that includes a variety of adjustable support elements that may hold and support computer components.

[0006] United States patent no. 6,286,794 to Harbin for an "Ergonomic Computer Mounting Device Permitting Extensive Vertical, Horizontal and Angular Ranges of Motion" teaches a column having a tilt and swivel mechanism for mounting a computer monitor thereon. The tilt and swivel mechanism is slidably mounted in a vertical track and a counterweight is provided to assist in vertical adjustment.

[0007] Other inventors have attempted to design systems for use with a chair or recliner. For example, United States patent nos. 4,880,270 and 5,056,864 to Cooper for a "Work Station System" includes a chair having a carriage secured thereto. A surface for supporting an input device and a keyboard are attached to the carriage. The chair is rockable about a horizontal axis, but the spatial distance between the surface for supporting an input device and the seated operator remain constant, as does the spatial distance between the surface for supporting the visual display and the seated operator.

[0008] United States patent no 5,779,305 to Hocking teaches "Work Stations" having a chair and a means to support pieces of equipment such as a personal computer, a printer

and the like. The station has at least two upright stanchions that project upwardly in a substantially parallel manner from a base. Sleeves are engaged on the stanchions. Support members for the pieces of equipment are attached individually or in combination to a sleeve or sleeves so the support members will extend from the sleeves in a direction substantially normal to the longitudinal axis of the stanchions.

[0009] United States patent no. 5,967,599 to Cauffiel for a "Cabinet and Table Assembly for Use with Seating Apparatus" teaches a table that can slide between extended and retracted positions relative to a chair and may also be horizontally pivoted between a working position and an out-of-the-way position.

[0010] United States patent no. 6,102,476 to May et al. for a "Computer Furniture with Integrated Computer" teaches a chair with a monitor support and a keyboard support mounted on a horizontal arm that is pivotally attached to the left armrest.

[0011] United States patent no. 6,425,631 to Lin teaches a "Computer Chair Assembly" having a chair with two armrests, wherein a pivot shaft is disposed on one of the armrests. A horizontal rod is supported on one end by the pivot shaft and on a second end by rollers and a support. The horizontal rod supports an article support frame that may be pivoted in front of or away from a user seated in the chair.

[0012] None of the above references are ideal for use by an individual experiencing severe back pain. For example, none of the references teach a vertically pivoting member that permits a user to easily access a bed or chair wherein the pivoting member may be manipulated with fingertip pressure due to counter-weighting of the pivoting member. Additionally, it is desirable for a work station system to provide the above benefits in

combination with structure that is adjustable in multiple ways to locate work pieces in an ergonomic orientation with respect to a user.

SUMMARY OF THE INVENTION

[0013] According to the present invention there is provided an improvement in an ergonomic computer workstation. The work station of the invention includes a base that extends beneath a human support device such as a chair, bed, or other structure. The base is preferably adjustable in length to accommodate human support devices of different widths. A riser extends upwardly from the base. A support arm pivotally connects to the riser and is stabilized by a support affixed to the riser and/or a support located at a distal end of the support arm. Preferably, both the riser and the supports are adjustable with respect to height for positioning a table at a desired height in front of a user. The support arm has a first section on a first side of the riser and a second section on a second side of the riser. The table is affixed to the second section of the support arm.

[0014] By pivoting the support arm, the table may be placed in a work position in front of a user or in a second position that removes the support arm and table as an encumbrance to egress from or ingress to the human support device. Preferably, the second position of the support arm is substantially vertical. A counter weight is affixed to the first section of the support arm. The counter weight allows for the support arm to be easily pivoted from the work position to the second position by application of only finger pressure. The table defines a plurality of retaining members for affixing selected computer components or other devices to the table, such that the devices do not move or fall off when the support

arm and table are pivoted from a horizontal orientation to a non-horizontal or vertical orientation.

[0015] A better understanding of the present invention, its several aspects, and its advantages will become apparent to those skilled in the art from the following detailed description, taken in conjunction with the attached drawings, wherein there is shown and described the preferred embodiment of the invention, simply by way of illustration of the best mode contemplated for carrying out the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 shows a perspective view of a work station of the invention.

[0017] FIG. 2 shows an elevation view of the work station of the invention wherein the pivot member and table assembly is shown in a raised and partially raised position in phantom lines.

[0018] FIG. 3 is a side elevation view of the work station of FIG. 1 wherein a computer monitor is shown positioned on the table in phantom lines.

[0019] FIG. 4 is a side elevation view of the work station of FIG. 1 wherein the table is shown in several positions with phantom lines.

[0020] FIG. 5 is a side elevational view of a work station of the invention shown positioned adjacent a chair and showing a position of a user.

[0021] FIG. 6 is a front elevational view of a work station of another embodiment of the work station of the invention.

[0022] FIG. 7 is an enlarged perspective view of a pivot arm support of FIG. 6.

[0023] FIG. 8a is a cross-sectional view taken along line 8-8 of FIG. 7.

[0024] FIG. 8b is a cross-sectional view taken along line 8-8 of FIG. 7.

[0025] FIG. 9a is a cross-sectional view taken along line 9-9 of FIG. 7.

[0026] FIG. 9b is a cross-sectional view taken along line 9-9 of FIG. 7.

[0027] FIG. 10 is a partial cross-sectional view showing a riser of a workstation of the invention, taken along lines 10-10 of FIG. 2 and showing an enclosed pneumatic lift cylinder.

[0028] FIG. 11 is a cross-sectional view of the pneumatic lift cylinder of FIG. 10.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0029] Before explaining the present invention in detail, it is important to understand that the invention is not limited in its application to the details of the embodiments and steps described herein. The invention is capable of other embodiments and of being practiced or carried out in a variety of ways. It is to be understood that the phraseology and terminology employed herein is for the purpose of description and not of limitation.

[0030] Referring now to FIGs. 1-6, shown is a work station **10**. Work station **10** has a base **12**. Base **12** has a first stabilizing member **14** and a cross member **16**. Cross member **16** is preferably adjustable in length to accommodate different sizes of chairs, beds or other human support devices. Cross member **16** may span between components of work station **10** (FIG. 1), or cross-member **16** may adjustably extend from a single set of components (FIG. 6). A first extension member **18** extends from the first stabilizing member **14**. A

second extension member **20** also extends from first stabilizing member **14**. Base **12** may additionally include a second stabilizing member **22**.

[0031] A first riser **24** extends vertically from first stabilizing member **14**. First riser has a first sleeve member **26** telescopically received on a first vertical base piece **28**. First sleeve member **26** defines a plurality of orifices **30** for affixing the first sleeve member **26** at a desired height, by means of a guide pin **31** (FIG. 10), securing devices **33** (FIGs. 3 & 10), both, or other securing devices.

[0032] A second riser **32** extends vertically from first stabilizing member **14**. Second riser **32** has a second sleeve member **34** telescopically received on second vertical base piece **36**. Second sleeve member **34** defines a plurality of orifices **38** for affixing second sleeve member **34** at a desired height by means of a guide pin **39** (FIG. 10), securing devices **33** (FIGs. 3 & 10), both, or other securing devices.

[0033] Referring back to FIG. 1, a first brace member **40** is affixed to first extension member **18** and first vertical base piece **28** for stabilizing first riser **24**. A second brace member **42** is affixed to second extension member **20** and second vertical base piece **36** for stabilizing second riser **32**. In an alternate embodiment, first brace member **40** and second brace member **42** are replaced with a plurality of tension members **44** (FIG. 5 & 6). Preferably, tension members **44**, which may be metallic cables, bicycle spoke-type rods or other members, extend between first stabilizing member **14** and first vertical base piece **28**, first stabilizing member **14** and second vertical base piece **36**, first extension member **18** and first vertical base piece **28**, second extension member **20** and second vertical base piece **32**,

cross member **16** and first vertical base piece **28**, and cross member **16** and second vertical base piece **36**.

[0034] A cross-support **46** spans between first riser **24** and second riser **32**. A pivot member **48** also spans between first riser **24** and second riser **32**. A support arm **50** is pivotally affixed to pivot member **48**. Support arm **50** has a first section **52** that terminates in a first end **54** on first side of risers **24** and **32**. Support arm **50** has a second section **56** terminating in a second end **58** on the second side of risers **24** and **32**. Preferably, cross-support **46** has a recessed portion for receiving first section **52** of support arm **50** when support arm **50** is in an upright position. A support arm cradle **60** is affixed to first sleeve member **26** and second sleeve member **34** of first riser **24** and second riser **32**. First pivot member cradle **60** is provided to maintain support arm **50** in a horizontal or work position.

[0035] In another embodiment, shown in FIGs. 6-9d, a support arm sleeve **62** is provided that has a first inverted segment **64** for contacting first section **52** of pivot arm **50**. First inverted segment **64** may be provided with a securing device for maintaining support arm **50** in contact with first inverted segment **64**, i.e., in a horizontal or working position. Examples of securing devices include a protuberance and mating orifice **65** (FIG. 8a) and magnet **66** (FIG 8b) for attracting support arm **50**. Support arm sleeve **62** is additionally provided with a second segment **67** for contacting second section **56** of support arm **50**. Second segment **67** may also be provided with a securing device for maintaining support arm **50** in contact with second segment **67**, i.e., maintaining support arm **50** in a horizontal or working position. Examples of securing devices include a protuberance and mating orifice **65** (FIG. 9a) and magnet **69** (FIG. 9b) for attracting support arm **50**. As shown in FIGs. 6

and 7, tension members **68** may be provided from the support arm sleeve **62** to first and second sleeve members **26, 34** of risers **24, 32**.

[0036] Referring back to FIG. 1, a first shelf **70** is preferably provided. First shelf **70** may be used to support a computer CPU and/or a printer or other device. First shelf **70** has a free pair of shelf supports **72** and an attached pair of shelf supports **74**. Attached pair of shelf supports **74** are preferably affixed to the first stabilizing member **14**. Shelf **70** and supports **72** and **74** can be mounted on either end of first stabilizing member **14**.

[0037] A second shelf **76** is preferably also provided. Second shelf **76** may be used as a work stand to hold a computer CPU/printer, papers or other materials. Second shelf **76** preferably has a free shelf support **78** and a pair of attached shelf supports **80**. Attached shelf supports **80** are preferably affixed to second stabilizing member **22**. Second shelf **76** is additionally supported by cradle stand **82**. Shelf **70** can be reversed on shelf supports **80** and **82** with free shelf support **78** attaching to shelf **70** on the opposite side of cross member **16** and second stabilizing member **22**. By permitting first shelf **70** and second shelf **76** to be located on either side of cross member **16**, a user has greater flexibility to set-up the workstation in a desired configuration.

[0038] Still referring to FIG. 1, cradle stand **82** extends vertically from cross member **16** proximate said second stabilizing member **22**. Cradle stand **82** has an arm receiving member **84** on an upper end thereof. Arm receiving member **84** is provided for receiving second end **58** of support arm **50**. Cradle stand **82** is preferably adjustable to allow for setting support arm **50** at a desired height, which preferably corresponds to height adjustments of risers **24** and **32**.

[0039] A pivotal counter weight receiving member **100** is pivotally affixed to first end **54** of support arm **50**. A selected amount of weight **102** may be affixed to counter weight receiving member **100** for counterbalancing support arm **50**. By selecting an appropriate amount of weight **102** a perfect balance of support arm **50** may be achieved about pivot member **48** for fingertip positioning of support arm **50** whether support arm **50** is unloaded or fully loaded.

[0040] A table **104** is rotationally affixed to second section **56** of support arm **50**. Table **104** is preferably secured to support arm **50** by a plurality of hinge members **106**. Table **104** preferably defines a plurality of retaining members **108**. Examples of retaining members **108** include grooves for receiving threaded securement devices, protuberances for engaging an item, receptacles for receiving protuberances from an item, slots for receiving protuberances from an item, hooks for grasping an item, or other suitable retaining features. Examples of items that may be retained on table **104** include keyboard or laptop computer **109a** (FIG. 2), mouse **109b** (FIG. 2), and monitor **109c** (FIGs. 2-5). Table **104** preferably has a work area **110** on a first side of support arm **50** and a monitor area **112** on a second side of support arm **50**. Locking members **114** are preferably provided on selected hinge members **106** for securing table **104** in a desired rotational orientation with respect to support arm **50**. Locking members may be worm gears that function to set table **104** at a desired orientation.

[0041] A human support device **120** (FIGs. 5 and 6) is positioned over cross member **16** such that a human is supported by human support device **120** in a position suitable for easily accessing computer components that may be affixed to table **104**. Preferably, support arm **50** is adjusted at an appropriate height and table **104** is rotationally positioned such that

a user may support his or her elbows on human support device **120** and have easy access to laptop computer/keyboard **109b** secured on table **104**. Additionally, work station **10** and/or human support device **120** is positioned such that the eyes of the user are positioned directly in front of monitor **109c** in an ergonomically desirable orientation.

[0042] To assist in positioning work station **10**, a pneumatic cylinder **130** (FIGs. 10, 11) may be located within one or both of risers **24** and **32**. Pneumatic cylinder **130** is preferably constructed of a base tube **132** and a sliding tube **134**. An air tight seal is formed between base tube **132** and sliding tube **134** with seal **136** (FIG. 11). A metering orifice **137** is provided to equalize pressure between base tube **132** and sliding tube **134** to provide shock absorbing action within risers **24** and **32**. A top cap **138** seals the top of sliding tube **134** and a bottom cap **131** seals the bottom of the base tube **132**. A top filler **140** (FIG. 10) preferably provides top cap **138** a flat area to apply lifting force equally within the conical neck between top cap **138** and pivot member **48** of risers **24** and **32**. A stem **142** preferably protrudes from sliding tube **132** for receiving air from a compressed air source (not shown).

[0043] In use, workstation **10** of the invention is preferably configured such that support arm **50** may be positioned in an upright orientation as shown in FIG. 2 with phantom lines. When support arm **50** is set in an upright position, a user may easily access a human support device **120** such as a reclining chair shown in FIG. 5 or a mattress shown in FIG. 6. Once a user has positioned himself or herself in a desired position on human support device **120**, a user may pivot the support arm **50** about pivot member **48** to easily position the table **104** in front of the user. To assist in manipulating support arm **50**, weights **102** are preferably mounted on counterweight receiving member **100** in an amount that perfectly

balances the weight of table **104** and computer components affixed thereto, such as, laptop/keyboard **109a**, mouse **109b**, and monitor **109c**. The computer components are preferably removably affixed to the table **104** such that the components do not inadvertently move when the support arm **50** is positioned in the upright position. If an appropriate amount of weight **102** has been affixed to the counterweight retaining member **100** then only fingertip pressure is required to manipulate the support arm **50** from an upright position to a horizontal or work position. Therefore, the workstation **10** of the invention is ideally suited for use by individuals having physical limitations such as back injury or other limitations.

[0044] When support arm **50** is in a horizontal position, the support arm **50** and table **104** is supported by a first pivot member cradle **60** as shown in FIG. 2. Alternatively, pivot arm **50** may be supported by support arm sleeve **62** shown in FIGs. 6 and 7. Support arm sleeve **62** works in conjunction with first inverted segment **64** and second segment **67** each of which functions to maintain the support arm **50** in a stable horizontal configuration. Additionally, a cradle stand **82** with cradle member **84** may be provided to support second end **58** of pivot arm **50**. To ensure optimum positioning, the table **104** may be rotationally adjusted about support arm **50** via hinge members **106**. Locking members **114** are utilized to affix table **104** in a preferred rotational orientation with respect to support arm **50**. Ideally, computer monitor **109c** is located in an ergonomic relationship with respect to the eyes of a user. For example, some people advocate that a monitor, such as monitor **109c**, should squarely address a user and that the monitor screen should be positioned approximately arms' length away from and slightly below the forward field of vision of the user. Preferably, a

user should be able to support his or her elbows on the human support device **120** and be able to access laptop computer/keyboard **109a** on work area **110** of table **104**.

[0045] When a user desires to discontinue work on the work station **10**, the user may apply light pressure to a support arm **50** and pivot the table surface **104** upwards until support arm **50** is in a vertical or upright configuration. Counterweight member **100** is offset slightly from a longitudinal access of the support arm **50**. As a result, when the support arm **50** is in an upright configuration, the pivot arm is weight biased to maintain balance through the full range of travel, i.e., the offset of counterweight member **100** functions to counterbalance items **109a**, **109b** and **109c**, when support arm **50** is in a vertical orientation. Travel beyond an upright position is restricted by the cross support member **46** visible in FIGS. 3 and 5.

[0046] As a further assistance to a user in adjusting a height of the table **104**, one or more of risers **24** and **32** may be provided with a pneumatic cylinder **130** located therein. The pneumatic cylinder **130** functions to easily adjust the height of risers **24**, **32**. Compressed air or other compressed fluid that may be provided by an electrical compressor or other means to drive pneumatic cylinder **130** to a desired position.

[0047] Depending upon the desired configuration, the workstation **10** may be comprised of components on a first side of human support device **120** and a second side of human support device **120** as shown in FIG. 2. Alternatively, it may be desirable to maintain or to locate components of workstation **10** on a single side of human support device **120** as shown in FIG. 6.

[0048] In summary, the work station of the invention provides an ergonomically positionable structure that allows for a user to easily access computer equipment such as a

keyboard and monitor while in a substantially horizontal or reclined position. The work station of the device is therefor ideal for individuals who experience back pain and for whom maintaining a seated position for extended periods of time is painful or impossible. An additional advantage of the workstation of the invention is that when properly configured, weights located on counterweight receiving member counterbalance support arm **50** about pivot member **48** such that support arm **50** may be easily pivoted from a horizontal position to a vertical position. Ideally, support arm **50** may be moved with only fingertip pressure. The ability to move support arm **50** from a vertical to horizontal position with minimal effort is desirable for individuals who are plagued with back pain. A further advantage of the invention is that support arm **50** may be pivoted upwards to a vertical position. The vertical position allows completely open access to the human support device whether the human support device is a reclining chair, a bed or other type of support device. Therefore, a user benefits from unobstructed ingress to and egress from the human support device.

[0049] A further advantage of the invention is that the support arm **50** is maintained in a vertical position by offsetting weights **102** from vertical when the support arm **50** is in a vertical position. By displacing the weights **102** from the vertical axis of support arm **50**, the support arm **50** is maintained in a balanced state, even when support arm **50** is in a vertical orientation, thereby preventing inadvertent movement of support arm **50**.

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[0050] While the invention has been described with a certain degree of particularity, it is understood that the invention is not limited to the embodiment(s) set for herein for

purposes of exemplification, but is to be limited only by the scope of the attached claim or claims, including the full range of equivalency to which each element thereof is entitled.